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of Dr. Gray's "Lessons" and "How Plants Grow," and are designed to be used in connection with these books. No doubt they will prove very suggestive to teachers of the little folks. Certainly, the subjects they treat are much more suitable pabulum for youngsters than the histology proposed by Mrs. Knight in her "Primer of Botany."

DR. GRAY'S last Contribution⁶ is before us, being a continuation of one in the last volume of the *Proc. Am. Acad.* It contains his notes upon the Rutaceæ, and only the beginning of Vitaceæ. Cneoridium is restored to Rutaceæ on account of its glands. Xanthoxylum is shown to be proper, and not Zanthoxylum. Amyris (formerly in Burseraceæ) is transferred to Rutaceæ, and a new species from Texas described. The only thing touched upon under Vitaceæ is Ampelopsis, which Dr. Gray retains as a genus, with *A. quinquefolia* as the type, thus not accepting Planchon's Parthenocissus, nor his definition of Ampelopsis.

NOTES AND NEWS.

PROF. THOS. C. PORTER sails for Europe May 26.

DR. J. PANCIC, of the Botanic Gardens of Belgrade, died March 8, at the age of seventy four years.

PROF. B. D. HALSTED has an interesting paper in the *Popular Science Monthly* (April) upon "California dry-winter flowers."

DR. PRANTL, called to the Eberswald school of forestry to succeed Dr. Luerssen, has declined, and will remain at Aschaffenburg.

THE ANNOUNCEMENT of the Shaw School of Botany for 1887-8 shows an attendance of 43 special students during 1887-26 in the spring and 17 in the fall.

NEW SPECIES of North American Phanerogams are described by Dr. N. L. Britton in *Bull. Torr. Club* (April), chiefly Cyperaceæ, together with critical notes upon certain noteworthy species.

THE FORESTRY DIVISION of the Department of Agriculture has issued a short circular on methods of increasing the durability of timber whose admonitions would be of value to wood consumers—if they would heed them.

PROF. E. L. GREENE, continuing his bibliographical notes in *Bull. Torr. Club* (April), replaces *Gleditschia monosperma* Walt. by the prior *G. inermis* Mill.; and the western *Hesperochiron Californicus* Watson by *H. nanus* Lindl.

THE RUMOR that Dr. Graf zu Solms-Laubach was to succeed Dr. De Bary at Strasburg is confirmed. He has declined the call to Berlin, and will enter upon his work at Strasburg at the beginning of the summer semester.

⁶ GRAY, ASA.—Notes upon some polypetalous genera and orders. *Proc. Am. Acad.* XXIII, pp. 223-227. Issued April 19, 1888.

A. A. CROZIER, assistant botanist to the U. S. Department of Agriculture, has been appointed botanist to the state experiment station at Ames, Iowa, and has already entered upon his duties.

THE REPORT of the botanical section of the Philadelphia Academy of Sciences for 1887 shows that the collection contains 27,267 species of phanerogams and ferns, over 1,000 of which were added during 1887.

DR. J. C. ARTHUR sails from New York May 16, and intends visiting the principal universities and experiment stations in England, Holland and Germany, returning in time for the A. A. A. S. meeting in Cleveland.

DR. H. FREIHERR VON BRETTFELD, professor of botany at the Polytechnikum of Riga, died in February, at the age of thirty-five years. He published an excellent work on the physiology of plants in relation to agriculture in 1884.

THE KEW BULLETIN for March contains seven numbers, as follows: Forsteronia rubber, Patchouli, W. African indigo plants, Vanilla (with plate, illustrating its fertilization), Streblus paper, Urera fibre (with plate of *U. tenax*), and Tea.

PROF. B. D. HALSTED is writing a series of five articles for the *Chautauquan*, under the following titles: (1) Seeds, and how they travel; (2) The unfolding of plant life; (3) Plants at work; (4) Flowers and fruits; (5) Flowerless plants.

AN INTERESTING article on the position of the roots of plants under field culture and their relation to moisture and cultivation is given by E. S. Goff in the last number of the Proceedings of the Western New York Horticultural Society.

A LIST of fungi which occur upon different cultivated fruits has been published by Baron von Thümen, under the title *Pilze der Obstgewächse*. The species found on the several parts of the plant are grouped alphabetically. There are over 4,200 kinds enumerated on 77 different hosts.

A LAW to make the destruction of barberry bushes obligatory in France, Spain, Italy and Switzerland, except for ornamental purposes in gardens and parks, on account of the æcidium promoting the increase of wheat rust, is being urged by the French National Society of Agriculture.

THE MEMORIAL pamphlet published by the University Press at Cambridge in honor of Dr. Gray contains the funeral sermon by Rev. A. McKenzie, order of funeral services, selections from the Bible read by Rev. Dr. Peabody, remarks by Dr. McKenzie, and an address by Dr. Peabody.

A LIST of 170 species of plants collected by Miss Mary B. Croft, in 1884-85, in western Texas, named by Drs. Britton and Rusby, is published in Transactions of the New York Academy of Sciences for 1887 (VII, p. 7), containing the description of one new species. This is a white-flowered *Houstonia*, *H. Croftiæ*, growing but an inch high. Some minor changes of nomenclature occur in the list.

ONE OF THE most thoroughly satisfactory illustrations of fungi we have ever seen is a photo-print of *Boletus luteus* tinted by hand in water-colors, illustrating an article on the use of photography for the larger fungi, by M. Bourquelot in the *Bulletin Soc. Mycologique de France* (III, p. 185) for 1887. The character of the pores on the under surface is brought out with marvelous softness and fidelity.

PROF. L. H. BAILEY, JR., of the Agricultural College of Michigan, has accepted the chair of horticulture in Cornell University, and of horticulturist to the agricultural experiment station, at a salary of \$3,000 a year, with a year's leave of absence to visit Europe at such time as he may select, without interruption of salary. He remains in Michigan until August.

A REVISION of the genus *Doassansia*, by Dr. J. B. DeToni, of Padua, Italy, is given in the current number of the *Journal of Mycology*, page 13. Eleven species are admitted, characterized in Latin, with full synonymy and additional notes. These species are exclusively American, while two others also occur in the United States. The bibliography contains titles of twenty-six articles and nine exsiccati.

THE POSITION and value of botany in agricultural experiment stations is broadly and suggestively treated by Dr. B. D. Halsted in *Agricultural Science* for March. The physiological, structural, systematic and pathological aspects of the subject are duly considered, and stress is laid upon the necessity of familiarizing the public with the fundamental facts of the science by means of carefully written bulletins.

THE *Journal de Botanique*, under the direction of M. Louis Morot, continues its second year with increased interest. A catalogue of Parisian plants, by Cornuti, is running through the numbers, while the following titles show the general nature of the papers: The Mutisiaceæ of Yun-Nan (with plates of new genera and species), by Franchet; The periderm of Leguminosæ, by Douliot; Nuclear and cell-division, by Strasburger; Herborisations about Montpellier, by Flahault; The fruit of Solanææ, by Garcin.

THE PATHOLOGY of pollen in hay-fever is discussed by Prof. Samuel Lockwood in *Jour. N. Y. Micr. Soc.* (April). A plate shows the pollen of *Ambrosia* and *Solidago*, and four possible modes of action for pollen in hay-fever are given, as follows: (1) Its suffocating effect as an impurity of the atmosphere, thus exciting asthma; (2) as a mechanical irritant, begetting inflammation, even to excoriation of the mucous membrane; (3) as a toxic agent, poisoning the tissues; (4) as a pseudo-parasite, penetrating the soft and sensitive parts.

THE RESISTANCE of pollen to external influences was the subject of a recent inaugural address by Herr Rittinghaus at Bonn (*Naturf.* 1, 1888). In the matter of temperature, 104.5° C. for 10 minutes was found to be the maximum for germination. A moderate temperature (32° C.) is favorable to the development of pollen tubes, while low temperature (under 9° C.) prevents germination. Vapor of chloroform for 20 min. was fatal, bromine vapor in 5 min., and ammonia in 10 to 20 min. The retention of the power of germination differs widely in plants, but the average is 30 to 40 days.

AT A RECENT MEETING (Feb. 16) of the Linnæan Society Mr. H. N. Ridley read a paper on self-fertilization and cleistogamy in orchids. The common methods of self-fertilization were described as follows: (1) By the breaking up of the pollen mass, and falling of the dust either directly upon the stigma, or into the lips, whence it comes into contact with the stigma; (2) by the falling of the pollen masses as a whole from the clinandrium into the stigma; and (3) by the falling forward of the pollinia from the clinandrium, or the anther cap, the caudicle and gland remaining attached to the column.—*Nature* (March 8).

BOTANY is strongly represented in the organization of the Tennessee experiment station. Prof. F. Lamson Scribner, at present chief of the section of vegetable pathology of the U. S. Department of Agriculture, is placed in charge of botany and horticulture, and also made professor in the university; W. E. Stone, now studying at the University of Göttingen, and well known to our readers as a contributor of articles on physiological botany is made chemist; and Prof. C. S. Plumb, of the university, and editor of *Agricultural Science*, who has made practical studies of cultivated plants and their diseases, is assistant director.

ILLUSTRATIONS of the dispersion of seeds and plants by way of the alimentary canal of various animals are given in *Nature* (March 15) by Mr. D. Morris. *Pithecolobium Saman*, a large and important leguminous tree, was introduced into Jamaica from Venezuela by means of cattle. The legumes were fed to the cattle during the voyage, and the seeds were voided free from the pod, and so much softened as to rapidly germinate. The tree was thus introduced by the very animals that required it most for shelter, shade and food. In India the *Acacia arabica*, or babul, is regularly induced to speedy germination by feeding babul leaves and pods to flocks of goats. In St. Helena they dare not use "urban" manure because the land would become overrun by prickly pear (*Opuntia Ficus-Indica*), the fruit of which is largely consumed by the inhabitants.

SKETCHES of the life and labors of Dr. Asa Gray are numerous, but no one that has reached us is more appreciative and judicious than that by Dr. J. D. Hooker, in *Nature* (Feb. 16). The opening paragraph gives us the place of our botanist in a new and very suggestive way: "When the history of the progress of botany during the 19th century shall be written, two names will hold high position, those of Prof. Augustin Pyramide DeCandolle and Prof. Asa Gray. In many respects the careers of these men were very similar, though they were neither fellow countrymen nor contemporaries, for the one sank to his rest in the Old World as the other rose to eminence in the New. They were great teachers in great schools, prolific writers, and authors of the best elementary works on botany of their day. Each devoted half a century of unremitting labor to the investigation and description of the plants of continental areas, and they founded herbaria and libraries, each in his own country, which have become permanent and quasi-national institutions. Nor were they unlike in personal qualities, for they were social and genial men, as active in aiding others as they were indefatigable in their own researches; and both were admirable correspondents. Lastly, there is much in their lives and works that recalls the career of Linnæus, of whom they were worthy disciples, in the comprehensiveness of their labor, the excellence of their methods, their judicious conception of the limits of genera and species, the terseness and accuracy of their descriptions, and the clearness of their scientific language."

DR. A. F. W. SCHIMPER has published an exceedingly interesting and valuable paper¹ upon the formation of calcium oxalate in foliage leaves and the rôle of calcium salts in the plant economy. The subject has long attracted investigators, and the literature is, therefore, quite extensive. Schimper finds calcium oxalate crystals in small quantities formed in leaves during their growing period, which he calls *primary*, and whose formation is not taken into account. The *secondary* calcium oxalate, however, occurs widely distributed in plants and in very considerable quanti-

¹ Bot. Zeit., nos. 5 to 10, 1888: Ueber Kalkoxalatbildung in den Laub-blättern.

ties. It is formed after the leaves have ceased growing, and its formation is directly dependent upon light, the presence of chlorophyll and transpiration, but is *not* related to the assimilation of carbon. It is shown that calcium oxalate can pass from one cell to another. This fact, together with those just cited, renders it probable that it is formed in the green cells and then passes to others more or less empty, where it crystallizes. He further shows that nitrate, sulphate and phosphate of calcium exist in leaves quite generally, particularly in the parenchyma of the veins and that neighborhood, where these substances seem to be stored. These salts are split up *by the green cells under the influence of light* and the nitrogen, sulphur and phosphorus used in the manufacture of proteids, while the calcium combines with oxalic and perhaps carbonic and other acids. The resulting salt is to be looked upon in this case as a by-product of nitrogen-assimilation, etc. But the calcium salts are shown to have another and quite important rôle, namely, to promote the translocation of the starch produced by carbon assimilation. Plants grown in calcium-free solutions accumulated starch in the green cells while the tissues in which it is ordinarily conducted away remain quite free from it. Moreover, under these conditions the epidermis of the plants used, which contained large leucoplasts, had very little starch gathered about them, while the green cells below and even the guard-cells were gorged with it. It would seem indisputable that the presence of calcium was indispensable for the transfer of starch. Schimper does not deny that the formation of proteids from inorganic materials may take place in other parts of the plant, as in meristem. Nor does he consider that the formation of proteid by fungi militates against his conclusions. The nitrogen-assimilation of fungi, he says, appears to depend upon entirely different chemical process from those in green plants.

CARL DÜNNENBERGER has published² an account of his critical researches upon the lightening of bread dough. The paper is a long and able one. His most important result is the showing that "the normal fermentation of bread is alcoholic, whether one uses yeast or leaven³ to render it porous." The only essential ferment organism is the yeast. Maltose, the substance fermented, is produced from a part of the starch of the flour by the action of a diastatic enzyme, *cerealín*. Bacteria are, as far as normal bread-fermentation is concerned, an impurity, and are absolutely unnecessary. The raising of bread dough depends, in the first place, upon the carbonic acid set free by the alcoholic fermentation. Afterward there is, in consequence of the temperature of the oven, an expansion of or volatilization of various substances which assist the raising action, namely, air, alcohol, water and (in an accessory, subordinate way) the volatile fatty acids formed by bacteria." Wigand's *Bacterium farinaceum* and Laurent's *Bacillus panificans* are thus thrown overboard, as far as their physiological action is concerned, and our light breads, whether by "salt-rising" or "Fleischmann's," depend on some budding saccharomycete.

DR. WILLIAM TRELEASE will sail for Europe early in June.

DR. GEORGE L. GOODALE has been appointed "Fisher Professor of Natural History" by the corporation of Harvard University.

² Bot. Centralblatt, no. 8, 1888, p. 245 et nn. seq.: Bacteriologisch-chemische Untersuchungen über die beim Aufgehen des brotteiges wirkenden Ursachen.

³ *I. e.*, dough left from one baking to another, either with or without the addition of an extract of hops or malt.